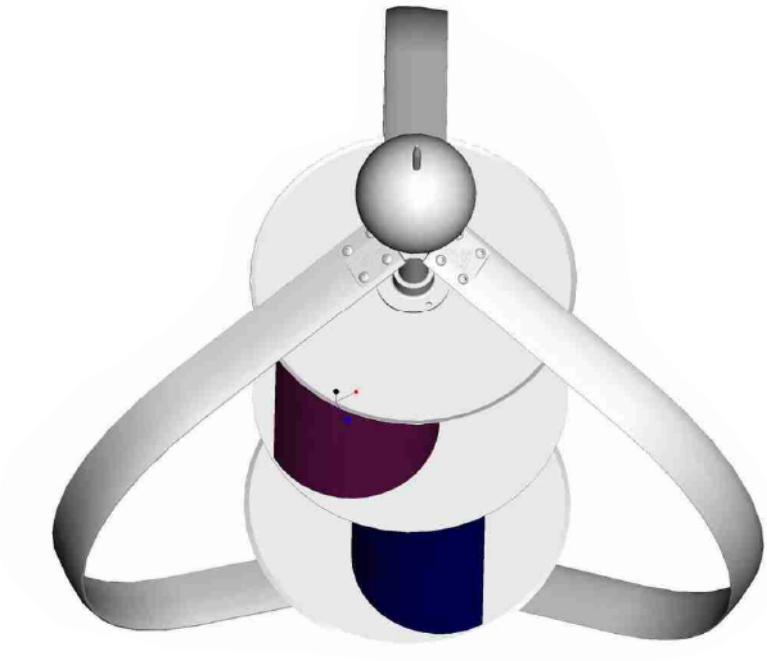
MBWP-400W

Vertical Axis Maglev Wind Turbine

User Manual



Alpek Co LTD

tel/fax +7.495.502.65.85 / + 7.499.723.57.61

info@manblan.ru

www.manblan.ru

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WARNING

THIS USER'MANUAL PROVIDES INSTRUCTIONS AND GUIDELINES FOR ASSISTANCE WITH ASSEMBLY OF THE TIAMR'S MBWP-400W VERTICAL AXIS WIND TURBINE (MBWP-400W VAMWT).

ALTHOUGH THE MBWP-400W VAMWT HAS BEEN DESIGNED AS EASY AS POSSIBLE FOR THE INSTALLATION, IT STILL REQUIRES SPECIALIZED SKILLS, TOOLS AND EXPERIENCE AS WELL .FOR THE PURPOSES HAS THE SKILLS, TOOLS REQUIRED TO DO SO. NO ONE SHOULD ATTEMPT TO ASSEMBLE, INSTALL, OPERATE AND MAINTAIN THE MBWP-400W WTG SYSTEM WITHOUT THE NCECSSARY SKILLS, EXPERIENCE, TOOLS AND SAFETY EQUIPMENT.

DISASSEMBLING THE PARTS FROM ORIGINAL IS RESTRICTED. ALL PREASSEMBLED PARTS ARE FACTORY ADJUSTED, BALANCED AND TESTED. TIAMR TECHNOLOGY CORPORATION ASSUMES NO WARRANTIES AND LIABILITIES OF DOING SO.

WE ASSUMES NO DIRECT OR CONSEQUENTIAL LIABILITY IF FACULTY OR DANCEROUS ASSEMBLING, INSTALLATION OR MAINTENANCE PRACTICES ARE PERFORMED. PLEASE CONTACT MANBLAN IF CONSULTATION OR ASSISTANCE IS REQUIRED.

WE RECOMMENDS THE MBWP-400W VAMWT SYSTEM SHOULD BE SITED ACCORDINGLY IN AN EXCLUSION ZONE WITH CONTROLLING PUBLIC ACCESS

.APPROPRIATE WARNING SIGNS SHOULD BE PLACED ON THE OPERATING SITE.

THE MBWP-400W SHOULD NOT BE INSTALLED NEAR UNPROTECTED POWER LINES,

TREES OR ANY

OBJECTS THAT WOULD POSSIBLY CAUSE THE HAZARDS OF THE OPERATION.

DISCALIMER

Although we recommends reading the entire manual thoroughly prior to assembly and installation to ensure proper performance and safety, this manual is intended as a guide only, It should not be considered as a replacement of professional services or as a definitive text for assembling and installing the MBWP-400W VAMWT SYSTEM.

We makes no warranties by either expressed or implied that the information contained in the manual is accurate or complete. We makes no warranties of fitness for a particular purpose and /or site. We will not be responsible for any direct or consequential damages, or an incidental expense.

All instructions, figures and diagrams are believed to be accurate at the time of printing. The success and safety in working with tools depend greatly on individual accuracy, skill and caution. For this reason, We is not only able to guarantee the result of any contained procedure in the manual, nor can they assume responsibility for any damage to property or injury to persons resulting from procedures contained in this manual. Persons who engage in the procedures take their own responsibility and risk.

Actual power resources and selected site conditions will highly affect the energy production, which will vary with wind turbine maintenance, surrounding environment, therefore, We makes no representation or warranties regarding energy production.

Wind generators, like other sources of electrical power, must be installed following the

guidelines established by local and national regulations. Please consult a local electrical contractor for details and regulations.

The information and all specifications contained within this manual are subject to change without notice.

1. Safety Precautions

The MBWP-400W is designed with user safety in mind. However, there are inherent dangers involved with any structural, mechanical and electrical equipment, the surrounding environment as well.

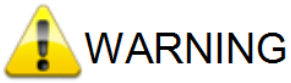
Safety must be the primary concern as you plan the location, assembly, installation and operation of the MBWP-400W VAMWT system. Be aware of electrical, mechanical and rotor blade hazards at all times.

This owner' manual contains important instructions, guidelines and safety notes that should be followed during the installation and maintenance of the MANBLAN MBWP-400W VAMWT.

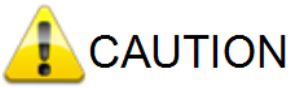
Please read thoroughly and follow the instructions in this USER's Manual before assembling and installing the MBWP-400W VAMWT system.

Please refer to the following symbols which are used throughout this manual to indicate

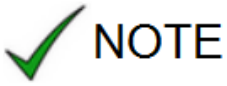
potentially dangerous situations, important safety instruction or important notes for you to know.



This WARNING symbol indicates a possible dangerous condition. Please use extreme caution when processing the procedure.



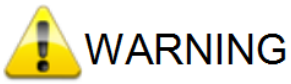
This CAUTION symbol identifies and improper operation that could result in critical safety issue or damage to the system controller or related devices.



The NOTE symbol describes an important procedure or issue for you to know to properly and safely operating the device.

1.1 Mechanical Hazards

Rotating blades present the most serious mechanical hazard. The MBWP-400W rotor blades are made of very strong anodized aluminum. Some edges of the blades are sharp. Please do not touch those sharp blades are not as sharp. They still will cause serious injury when they start rotating, even at low speed.



- *NEVER TOUCH THE RUNNING ROTOR.*
- *NEVER TRY TO STOP THE ROTOR BY HAND*
- *DO NOT INSTALL THE MBWP-400W VAMWT SYSTEM WHERE ANYONE CAN APPROACH THE*
- *PATH OF THE BLADES.*
- *AVOID ANY OBJECTS TOUCHING THE RUNNING ROTOR.*

1.2 Electrical Hazards

The MBWP-400W VAMWT system is equipped with sophisticated generator and designed to provide protection from electrical dangers.

Heat in wiring system is often a result of too much current flowing through and undersized wire or through a bad connection. It is important to follow the suggested wire-sizing chart to ensure a safe electrical system.

The battery, if applied, should never be short-circuited as it will result a danger of setting the battery and cable on fire. In order to avoid the threat and protect the cabling, fuses should be installed in the lines connecting to the battery.

WARNING

- *WIRING CABLE WITH INSUFFICIEN TLY DIMENTIONED CROSS SECTION CAN CAUSE ELECTRICAL FIRE*
- *NEVER SHORT-CIRCUIT THE BATTERY IF APPLIED.*

1.3 Assembly

The MBWP-400W VAMWT System is designed in " All Most Ready to Use" format and shipped with factory pre-assembled packing. The only assembly work required is Darrieus blades assembly. This user' manual will guide you through the assembly procedure with detailed illustrations.

NOTE

- *Please carefully read the assembly instructions in this manual before proceeding.*
- *It is important to have a suitable working environment for performing the assembly tasks.*
- *Refer to the suggested list of tools required for the assembly and have all of them ready before proceeding.*

WARNING

PLS ALWAYS KEEP SAFETY IN MIND WHILE PERFORMING THE ASSEMBLY PRODEDURES.

ALWAYS WEARS SAFE HELMET AND GLOVES.

1.4 Installation

A fall from the height at which a wind turbine is ordinarily mounted will often result in death or serious injury. Therefore whenever practicably carry out as much work as possible on the wind turbine at ground level. If it is necessary to work on the installation at such height then use an appropriate access system such as a mast that is designed to carry the load of a person; a man-rated winch or rope access system; a hydraulic lift or other safe working platform. Wear appropriate safety equipment and make the general working area as tidy and safe as possible. Work during the daylight on windless days .Above all else think carefully about what u need to do and plan your work carefully, have all the tools and equipment ready before your start.

CAUTION

- *Installation procedures should be performed as much as possible at ground level.*
- *Use safety harnesses, safe Helmets, gloves, etc.*
- *Make sure that all batteries, if applied, are disconnected from the system throughout the installation process.*
- *The MBWP-400W generator is short-circuited to prevent unintended rotating during the shipment. Please install the extension cable on the ground level and keep it short-circuited throughout the installation process.*
- *Please keep the rotor straight up or lie on the suggested stands at all-time during the installation process to prevent the blades twisted or lost balance.*
- *Please perform the installation at a calm and windless day.*

1.5 Operation

Please check the support structures, blades and electrical system on regular basis.

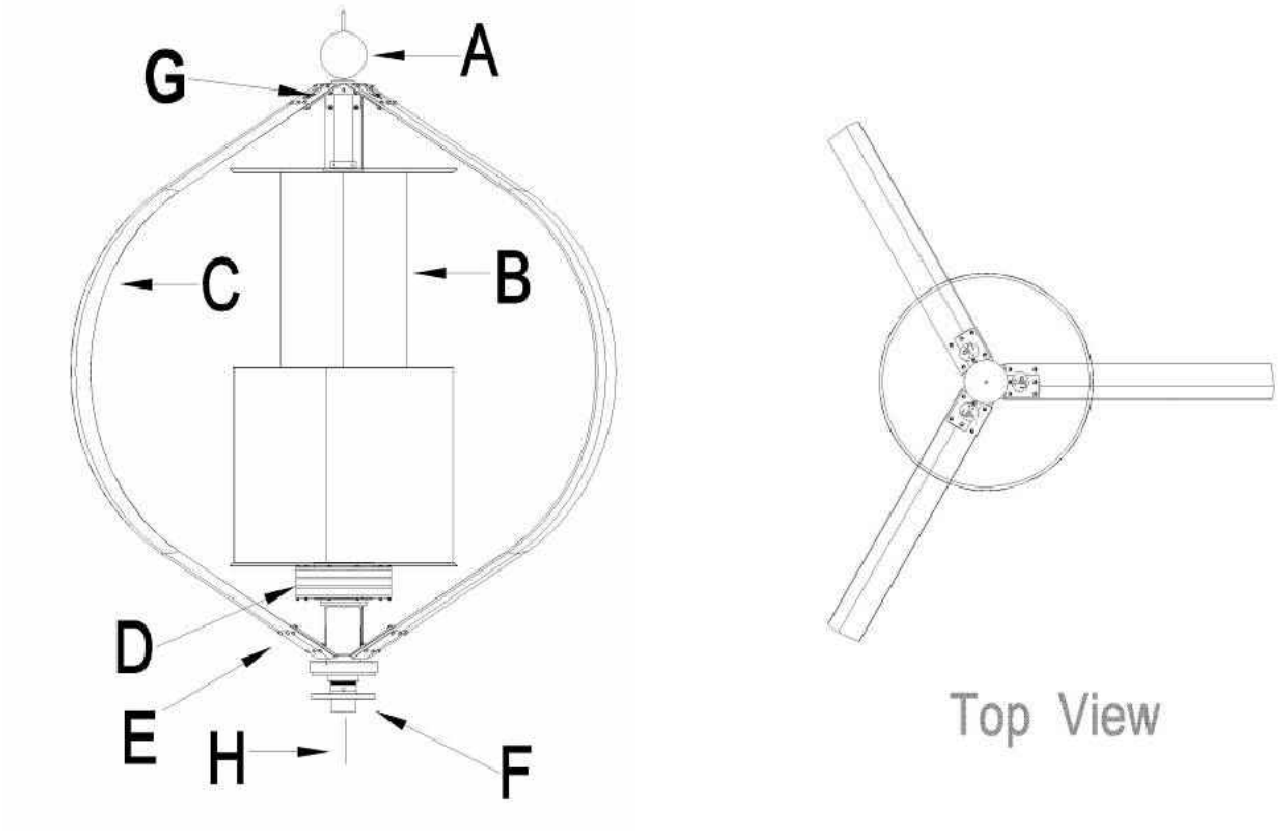
- Even though the rotor blades are very strong, however, if they come in contact with a solid object, they can be distorted or even broken.
- When perform routine inspections , or at anytime you must approach the path of the blades, please disconnect the power leads from the batteries and short-circuit the wind turbine output leads to stop the rotor blades from rotating. The MBWP-400W is designed to be shut down through the use of stop switch (brake switch).
- NEVER APPROACH THE TURBINE DURING OPERATION.

2. INTRODUCION

The MBWP-400W is a hybrid Vertical Axis Wind Turbine (VAMWT) system which

combines drag-based design and lift-based design. It incorporates an S-type of Savonieus rotor and three airfoil blades of egg-beater shape Darrieus to maximize the output performance.

Figure 2-1 General View of the MBWP-400W VAMWT System



Parts	Description
A	Lightening Arrestor
B	S-Type Savonieus
C	3-Darrieus Blade with Built-in Airfoil
D	3-Phase, Direct-Drive, Weather-Sealed, Mechanically Integrated Permanent Magnet Generator.
E	Lower Darrieus Blades Connector
F	Damper
G	Upper Darrieus Blades Connector
H	3-Phase,Generator Wires

2.1 MBWP400 Specification

The following Table 2-1 shows a general view and major components of the MBWP-400W VAMWT system.

Table 2-1 MBWP-400W VAMWT Technical Specification

General Information	
Rotor Diameter:	1.06 m
Height:	1.2 m
Weight:	25 Kgs
Blades:	
Number of Blades:	3
Blade Material:	Anodized Aluminum Alloy
Operate Mode	
Start-up Wind Speed:	1m/s
Cut-in Wind Speed:	2.5m/s
Cut-out Wind Speed:	15m/s
Survival Wind Speed:	65m/s
Safety Mechanism	
Over Speed Braking:	Yes. (Setup by Power Controller)
Manual Brake:	3-phase short-circuit Switch
Generator	
Type:	AC, Direct Drive, Weather Sealed, 3 Phase Synchronism PMG.
Rated Output:	400W @ 12m/s
Mounting	
Foundation Mounting:	Min. Height above ground: 3M
Roof Mounting:	Min. Height above Roof: 3M
Bedplate Mounting:	Used where deep excavation cannot be applied
Warranty	
Limited Warranty:	Two years on components

2.2. MBWP-400W Standard Packing

Before starting the installation, please check all components you receive from the shipment with the packing list that comes with the purchase invoice or the enclosed parts list in the shipment. Ensure that you receive all standard components or parts for the MBWP-400W

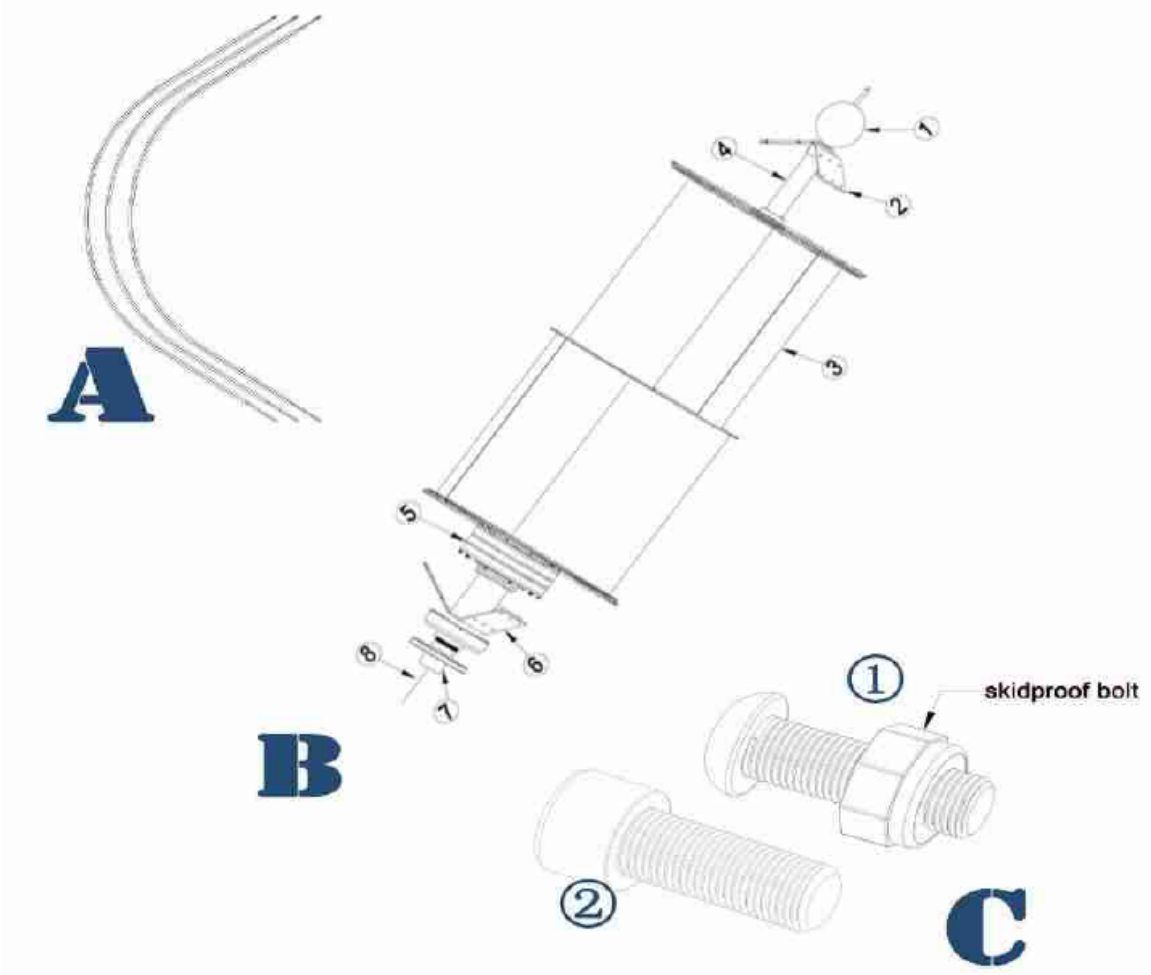
VAMWT system accordingly. If any missing parts from the original packing, please contact MANBLAN for replacement.

Table2-2 shows the standard packing of MBWP-400W VAMWT system. Please also refer to Figure 2-2 for part locations. Detail assembly instructions will be discussed in Chapter 4-Assembly and Installation.

Table 2-2 list of MBWP-400W system component:

Labels	Description	Qty. Included
A	Anodized Aluminum Blade (Assemble Needed)	3
B	Pre-assembled Components	1 set
1	Lightening Arrestor	1
2	Upper Blades Connecting Plate	1
3	S-type Savonieus	1
4	Vertical Axis	1
5	400W, PM Generator	1
6	Lower Blades Connecting Plate	1
7	Mast Connector with Damper	1
8	R.S.T Generator Wiring Cables	3
C	Bolt Sets	
1	M10×25mm hex head Skidproof bolts and nuts (set)	24
2	M10×25mm Round Hex bolts	6
	plain cushion	6
	spring pad	6

Figure2-2 MBWP-400W Standard Packing Contents



2.3 MBWP-400W Optional Parts

This MBWP-400W VAMWT system is designed with simplicity in mind, so there are just a few parts needed which all included in the standard package. Concerning the shipping cost and different applications applied by customers, the required mounting mast to setup the MBWP-400W wind turbine is not included in the standard package. It would be an optional part based on customer's choice. The detail description of the mounting mast will be explored in Chapter 3.

3. Preparation of assembly and installation

Before going through the MBWP-400W VAMWT system installation procedures, please double check parts included in the package. Prepare all required tools and equipments

accordingly and have them ready on hands. More importantly, all safety issues have been well thought and followed.

3.1 Selecting Location

The MBWP400 VAMWT system is designed with flexibility to fulfill users' applications. It can be installed along the sea shores, on the mountains, in the cities, urban areas, or just right on top of the roof of the buildings. The major key factor of affecting the performance of MBWP400 MVAMWT for all proposed applications is the location of optimizing wind energy.

We assume that the proper site of installing the MBWP-400W MVAMWT system has been well evaluated by users themselves for optimizing the wind energy environment before any installing procedures performed.

DO NOT install the MBWP-400W MVAMWT system at a site where anyone can easily approach the rotating blades.

DO NOT install the MBWP-400W MVAMWT system at a site surrounded by obstructions. For example, trees, power lines, etc.

DO NOT install the MBWP-400W MVAMWT system at a site with unsuitable structure to hold the MBWP400 VAMWT system.

- *Always follow your local regulations, codes about restrictions applied to such system installation.*

- *Always have your MBWP-400W MVAMWT grounded to avoid the lightning strike.*
- *Perform the installation of the MBWP400 VAMWT system in a calm and windless day.*
- *Perform all required assembly for the MBWP400 VAMWT system at ground level.*

3.2 Mast Preparation

As mentioned before, shipping charge of the mast made by MANBLAN will be costly. If you prefer making your own mast for MBWP400 VAMWT system rather than purchasing from MANBLAN , we will show you here how the mast can be made by your local supplier.

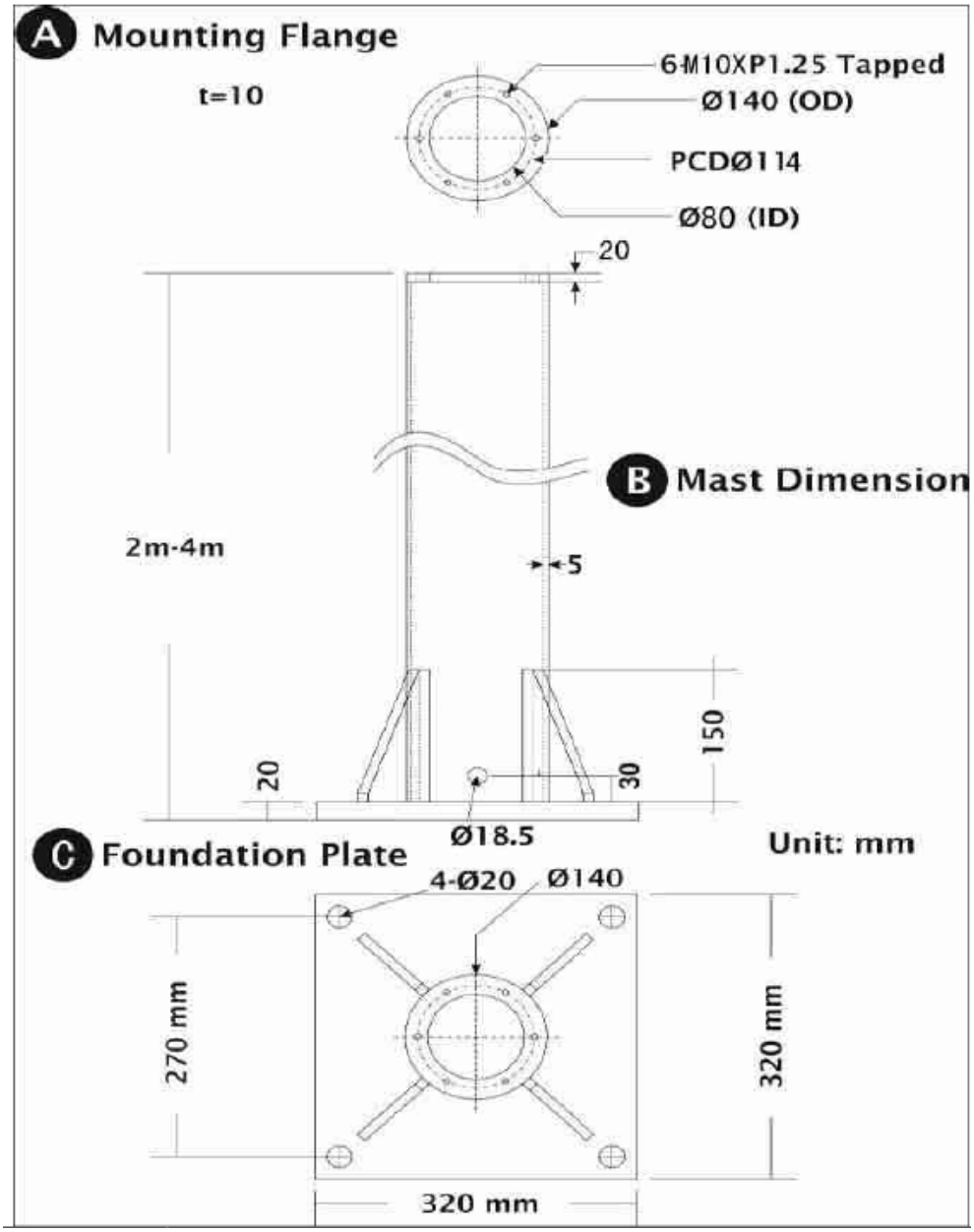
In the Figure 3-1, the Mast Specification was originally designed and tested on the MBWP-400W MVAMWT system. It has been approved and applied as the standard the MBWP-400W VAMWT system. It is important to follow the diameters shown in Figure3-1 for Mounting Flange and Mast of the MBWP-400W VAMWT system.

CAUTION

- *Please carefully check the structure of the building if you are going to install MBWP-400W VAMWT system on the roof, make sure the structure is strong enough to endure MBWP-400W VAMWT system in terms of total weight, impact from gusty wind or earthquake, etc. MANBLAN suggests the length of the mast is 3m max for the roof installation and 4m for the ground.*
- *carefully check the surrounding area when determines the length of the mast. Avoid any existing objects that affect the performance of wind energy or cause hazards.*

The following Figure 3-1 shows the diagram for making the mast.

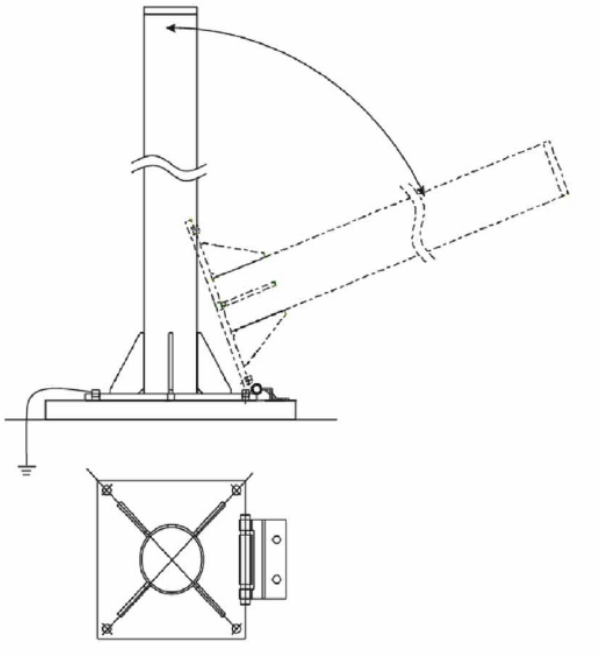
Figure3-1 Dimension for Mast



A	This portion shows the dimension of the mounting flange which should be welded on top of the mast for connection with CXF-400W VAMWT System. ● Flange Inner Dia.＝¢80mm ● Flange Outer Dia.＝¢140mm ● 6-¢8mm×P1.25 Tapped bolt holes on PCD ¢115mm (60°each) ● Flange thickness＝10mm
B	Mast Dimension: ● Prototype Design material: 140mm×5m/m galvanized steel pipe. ● Mast Outer Dia.＝¢140mm ● Mast Inner Dia.＝¢120mm ● Standard Length of the Mast: 3m ● Mounting flange welded on the top of the mast. ● Foundation Plate welded under the bottom of the Mast with 4 support ribs (t＝10) ● Drill a 18.5mm diameter hole at 30mm above the bottom of the mast. This hole is reserved for wiring cable exit. If an underground conduit is applied in the concrete foundation, then ignore this exit.
C	Foundation Plate Dimension: ● 320mm×320mm ● Thickness＝20mm ● 4×¢25mm bolt holes on 270mm ×270mm ● 4×10mm in thickness of support ribs

Figure 3-2 Optional Mast Design

3.3



Foundation Guide for MBWP-400W

Before construction the foundation for the MBWP-400W system, read these instructions carefully. These instructions are only intend to be guide for concrete foundation on solid soils or suitable roof infrastructure. Please contact your local civil or structure engineer for more information.

3.3.1 Ground Foundation

The foundation should be prepared as 1cubic meter in dimension (1000m/mX1000m/mX1000m/m) depth, dug into the soil. Please follow the diagram shown in the Figure 3-1, make a template of the mast bottom. This template will be temporarily used for holding four Anchor Bolts vertically and electric conduit (if applied) in the precise position while pouring concrete into the foundation hole later. Insert rebar into the foundation hole and jack up to approximately the right height. Prepare the electrical conduit in place before pouring the concrete if a hidden wiring method is applied. Attach the M16 screwed rods with nuts provided to the template. Make sure there have at least 100mm of

thread above the concrete level. Fix the conduit through the center of the template and push the end of other of conduit to the side of foundation (If applied).

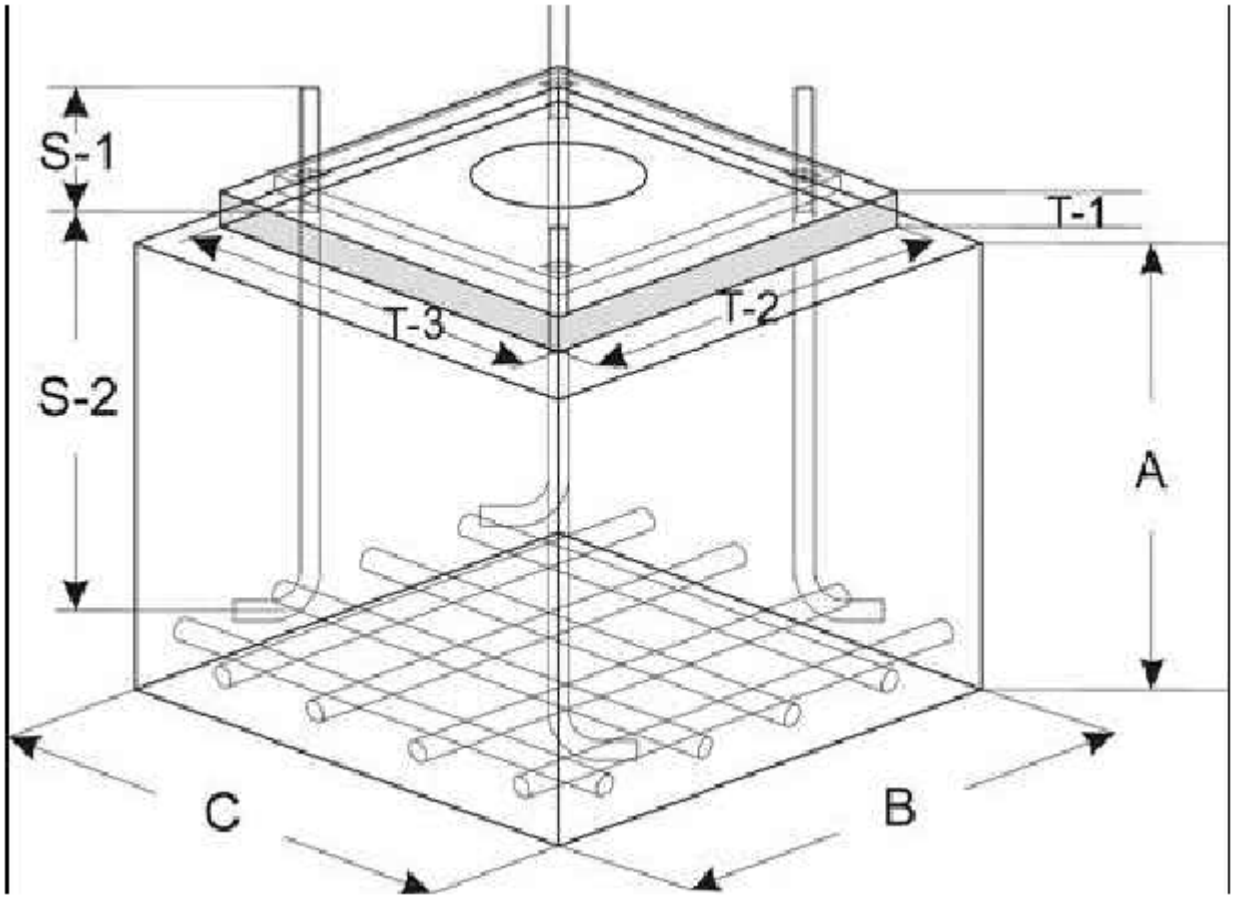
Add the concrete, using a vibration poker to remove air voids from the pour. It is very important to make sure that the all four rods are hooked under the rebar. Once the concrete is all poured, make sure that the template has no air voids directly underneath. More importantly, make sure the template is leveled off.

Next, clear excess concrete from above template and use a suitable cover to prevent the foundation from rain. Wait until the concrete has set complete before removing the template (It will take at least for one week).

Just remember, a solid with perfect leveled foundation is one of the key factors to achieve the success of installation.

Please refer to the Figure 3-3 for MBWP-400W foundation construction.

Figure 3-3 Ground Foundation Construction Reference



A	1 meter	
B	1 meter	
C	1 meter	
T-1	30mm	Concrete
T-2	400mm	Concrete
T-3	400mm	Concrete
S-1	100mm	
S-2	200mm	

List of Material

1	1 Cubic meter of concrete-35 Newton or better
2	4-M16 with length of 360m/m galvanized Anchor Bolts. One end is bent into a hook shape.
3	4-M16 Nuts
4	4 Galvanized washers
5	Electrical conduit, 100m/m diameter pipe or similar, maybe needed for underground wiring, if applied.

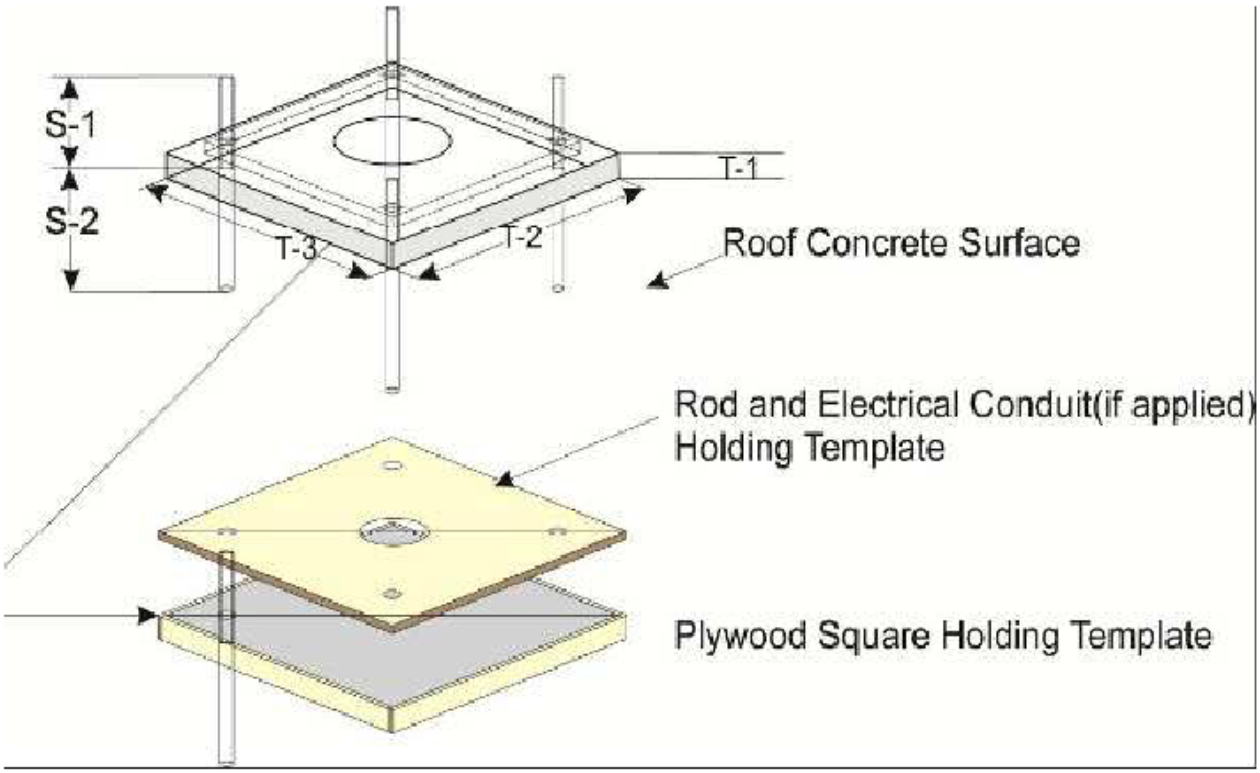
3.3.2 Roof Foundation

Installation of the CFX400 VAMWT System on the roof may be much easier than it is on the ground. But special thought of the building structure has to be carefully taken into account before installation.

We strongly suggest that the location on top roof surface should be above the concrete beam. Any surface other than concrete should contact their own architect or structure engineer for advice and take their own responsibility for any possible danger. The concrete roof should be thick enough to allow 100mm drilling down from the surface. Please follow the template explained Section 3.3.1 and use this template as a guide and drill four ¢ 20 holes 100mm deep down to the surface. Insert and secure four threaded rode to each hole, use 4mm plywood to make a square holding template with inner dimension T1ЧT2ЧT3, pour the concrete into the square template, then put the first template on

top of the square template to hold four rods temporarily before the concrete set complete and keep the surface leveled.

Figure 3-4 Foundation for Roof Installation Reference



Dimension Chart

T-1	30mm	
T-1	400mm	
T-1	400mm	
S-1	60mm	
S-2	100mm	

WARNING

- *Although the MBWP-400W VAMWT System is designed to be installed on the roof alternatively, but MANBLAN does not recommend to do so unless you are 100 percent sure that the structure of the building is capable of doing so.*
- *Please consult your local structure engineer and carefully evaluate such implementation before taking any further actions.*
- *It is user's responsibility to make sure that structure of the building is able to sustain the force of operating MBWP 400 VAMWT System on the roof. MANBLAN is not responsible for any potential damage or dangerous factors caused by insufficiency of structural design of the building.*
- *Please closely follow your local government's regulations regarding related issues if you are going to install MBWP-400W VAMWT System on the roof.*
- *If you are going to install the MBWP-400W VAMWT System on the ground level, please consult your local civil engineer and carefully evaluate the nature of the soil and design of the foundation accordingly.*

4. MBWP 400 Assembly and Installation

Before starting the assembly and installation of MBWP-400W Wind Turbine System, please well prepare all required tools to complete the assembly and installation.

4.1 Tools Required for Assembly and Installation

As the MBWP-400W is factory pre-assembled, only a few tools required for finishing entire assembly and installation. We are strongly recommending having a crane with

suitable capacity to haul up the mounting mast to desired location and also lift up the MBWP-400W to the mounting flange, please refer to Figure 4-1 for your tool preparation.

Figure 4-1 Required Tools for Assembly and Installation

1 **Girder Crane or Crane Truck**

For indoor assembly, you may need a girder crane with capacity of 2 tons and at lease 12 meters height of lifting space. If the assembly work is going to be performed outdoor, a crane truck with approximately same capacity with be required. It is very important to have certified person to operate the crane.

2 **Steel Support Stands**

A pair of steel support stands will be required for the assembly procedures. The height of each stand should be approximately 115cm to 120cm. Please also make sure all stands can hold up the weight of the CXF-400 VAWT. (The weight of the CXF-400 VAWT is about 25 kgs)

3 **Adjustable Wrenches or Other Proper Wrenches**

4 **Hex Allen Wrenches: M12 and M16 Hex Allen Wrenches**

5 **Nylon Slings: At least two Nylon Slings with proper length.**

6 **Safety Caps and Gloves**

NOTE: FOR YOUR SAFETY, PLEASE WEAR SAFETY CAP AND GLOVE AT ALL TIME.

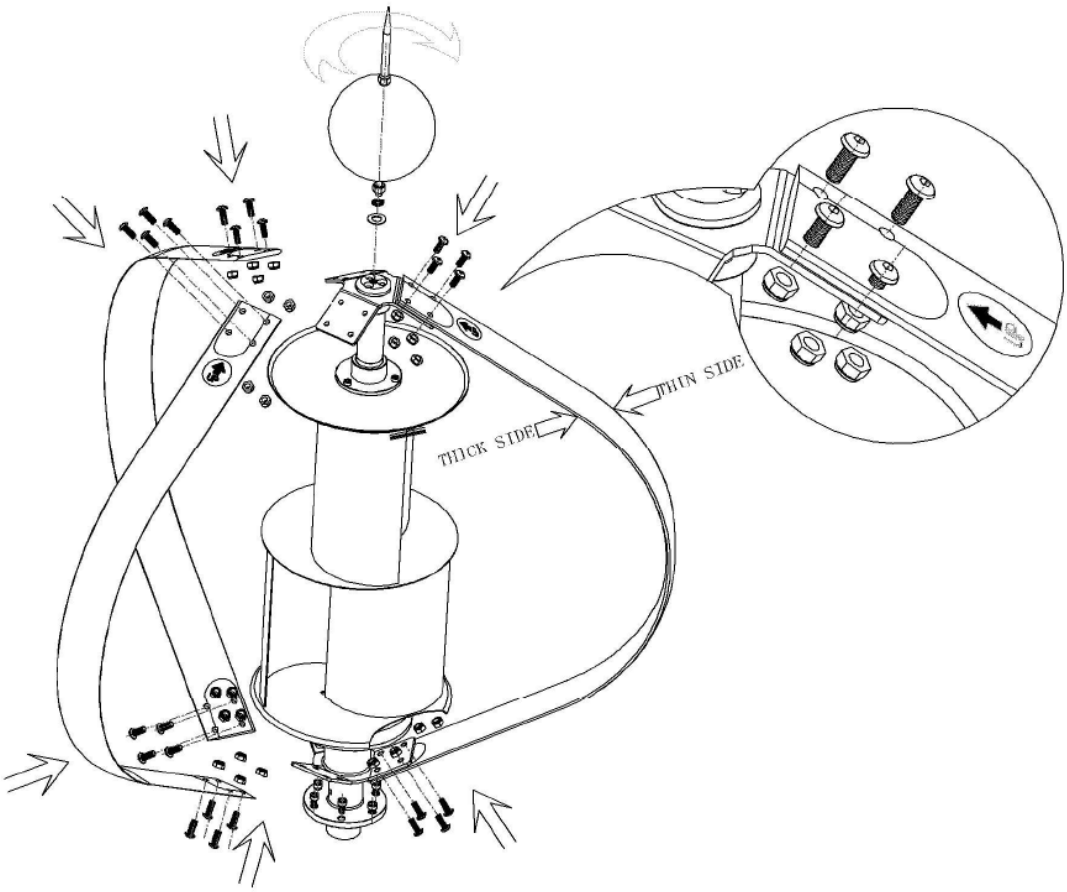
CAUTION

- *We strongly recommend you to prepare all suggested tools before processing the assembly and installation.*
- *Please always keep safety in mind while working on the assembly and installation.*
- *Preparing extra equipments or safety devices accordingly if instructed by your local authority.*

4.2 MBWP-400W VAMWT Assembly

There are only a few steps to assemble the MBWP-400W. Please follow the figure 4-2, 4-3 and 4-4 Assembly Procedures to complete the assembly.

Figure 4-2 MBWP-400W Assembly Procedure



Insert 4 M10Ч25mm Hex Head Skidproof Bolts for each one of the blades on the upper blade connector. Do not lock these four bolts yet until another 3 sets of M10Ч25mm Hex Head Skidproof Bolts inserted for Lower Blade Connector. Now use Wretch to securely lock blade on upper blade connector and lower blade connector. Repeat this step for second blade and third blade and lower section as well.

The alignment of both upper blade connector and lower blade connector has been factory pre-lined up.

CAUTION

- *Each blade has a mark “UP”on one side; please connect the “UP”end with the upper blade connector. Do not connect “UP” end with lower blade connector*
- *If you are not able to see the “UP”mark on the blade, you may find three M10 holes on both blade and connecting plate, just matching up each hole so you won’t assemble the blade with wrong direction.*

WARNING

For safety concern, please short circuit the RST Generator Wiring Cables temporarily to stop rotor from rotation.

Make sure that all three blades have been securely locked on both upper blade connector and lower blade connector. Next step is to assemble the MBWP-400W VAMWT System with the Mast Connector/Damper. Please use proper lifting device, such as crane, to the lift the MBWP-

400W up to the height that enough to put the Mast Connector/Damper under the main shaft of MBWP-400W, then insert the main shaft into the Mast Connector/Damper. There are two indents on the lower main shaft and should be lined up with two lock screw hole on the Mast Connector/Damper.

WARNING

Indents on the lower main shaft must be lined up with lock screw holes on the Mast Connector/Damper and securely locked. Fail to do so will cause the generator cables broken during break applied.

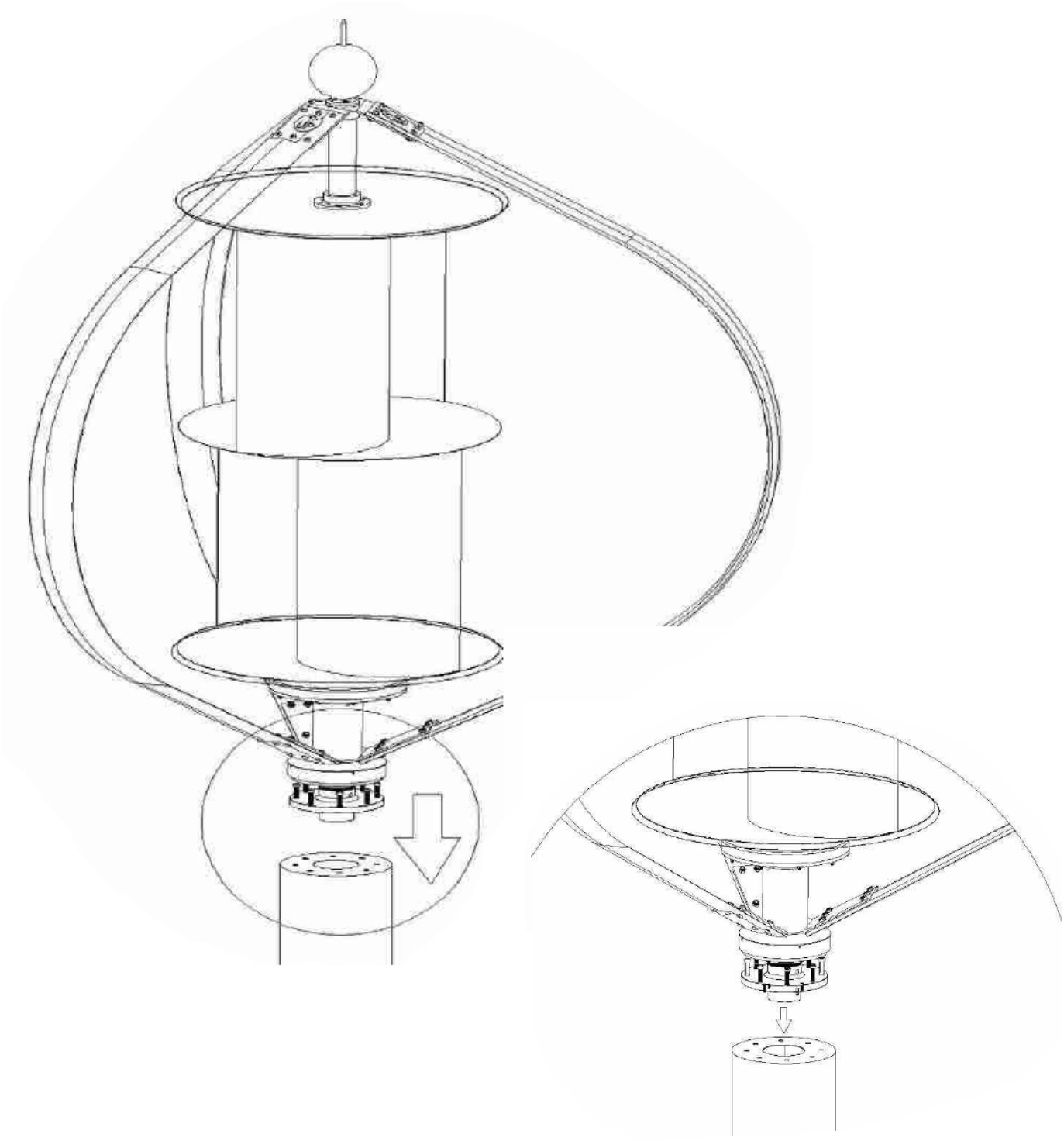
4.3 MBWP-400W Installation

WARNING

- *Double check with assembly procedures and make sure all screws are securely locked. Any Loosen screws will cause serious vibration and parts damaged.*
- *If you are going to install the MBWP-400W VAMWT System at certain height, please have proper safety devices ready for proceeding installation.*

Use proper Lifting Device (Crane) to lift up above the mast flange. Then vertically insert the MBWP-400W into the mast and securely lock Mast Connector/Damper with Mast Flange with 6 M10Ч25mm Round Hex Head Bolts.

Figure 4-3 MBWP-400W Installation Procedure



NOTE

- *There are 3 proper sizes of wires should be pre-installed inside the Mast.*
- *securely connect the RST Generator Wire with these pre-installed wires.*

5. Wiring

5.1 General Information

Please refer to all local and national codes or special regulations to be followed before installation. All works on the electrical system like installation, maintenance and repair should be carried out by qualified technicians and make sure that they read all technical information and instruction contained in related manuals.

The wiring diagram should be planned ahead and make sure that all required wiring components are well prepared accordingly.

CAUTION

- *carefully plan all required electrical components, and install electrical components first before any electrical connection.*
- *Make sure that batteries (if applied) should be disconnected all installation works are completed.*
- *All electrical power cables should be physically protected. Run the wires inside the mast of conduit for maximum protection.*

5.2 MBWP-400W Wire Size

The cross section of the wire to be used depends on its length, resistance and rated current.

All electrical system loses energy from the resistance of the wire used. Larger wire size has smaller losses, but can be considerably more costly.

Closely look at the site that MBWP-400W is to be installed and measure the following distances:

- Distance between MBWP-400W and the location of the controller for MBWP-400W
- Distance between Solar panel and the location of the controller for MBWP-400W
- Distance between LED lamp and the location of the controller for MBWP-400W
- Distance between battery and the location of the controller for MBWP-400W

Please follow the reference table below for wire sizing:

Table 5-1 Wire Sizing Reference

Distance Between Generator and Controller					
	0-10m	10-20m	20-30m	30-50m	>50m is not suggested.
AWG Gauge	12	12	10	8	

5.3 MBWP 400 Wiring Diagram

The MBWP-400W VAWT System is designed in collaboration with controller alone and for both Solar Panel and controller. Both wiring diagram will be illustrated in Figure 5-1 and Figure 5-2.

We makes no warranty that MBWP-400W Wind Turbine System will work with power management devices.

Figure 5-1 Wiring Diagram for Wind turbine and Controller

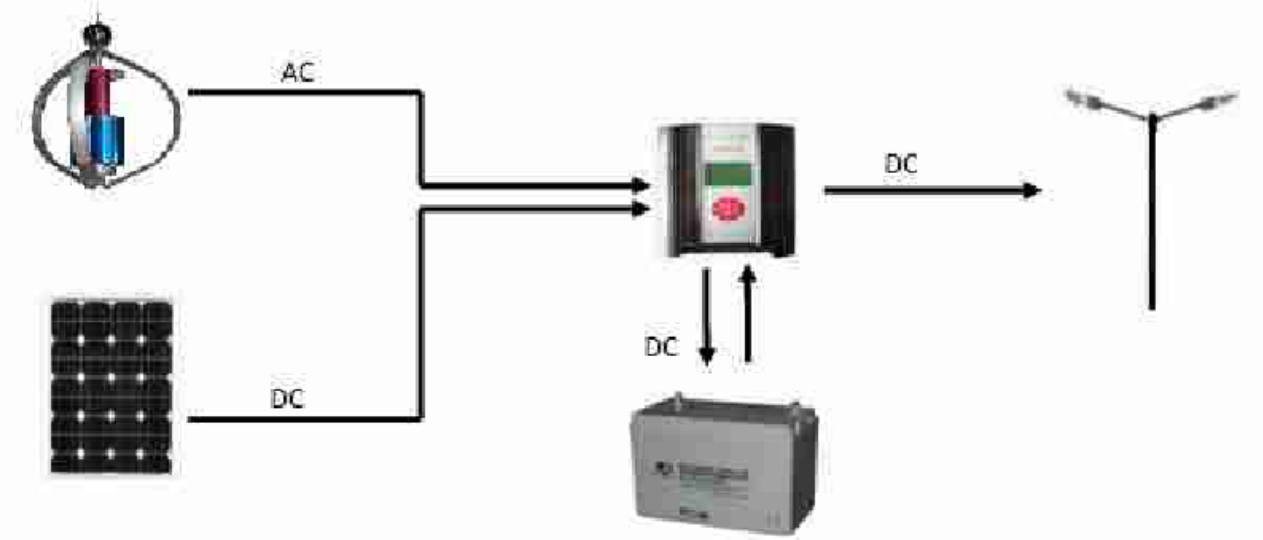
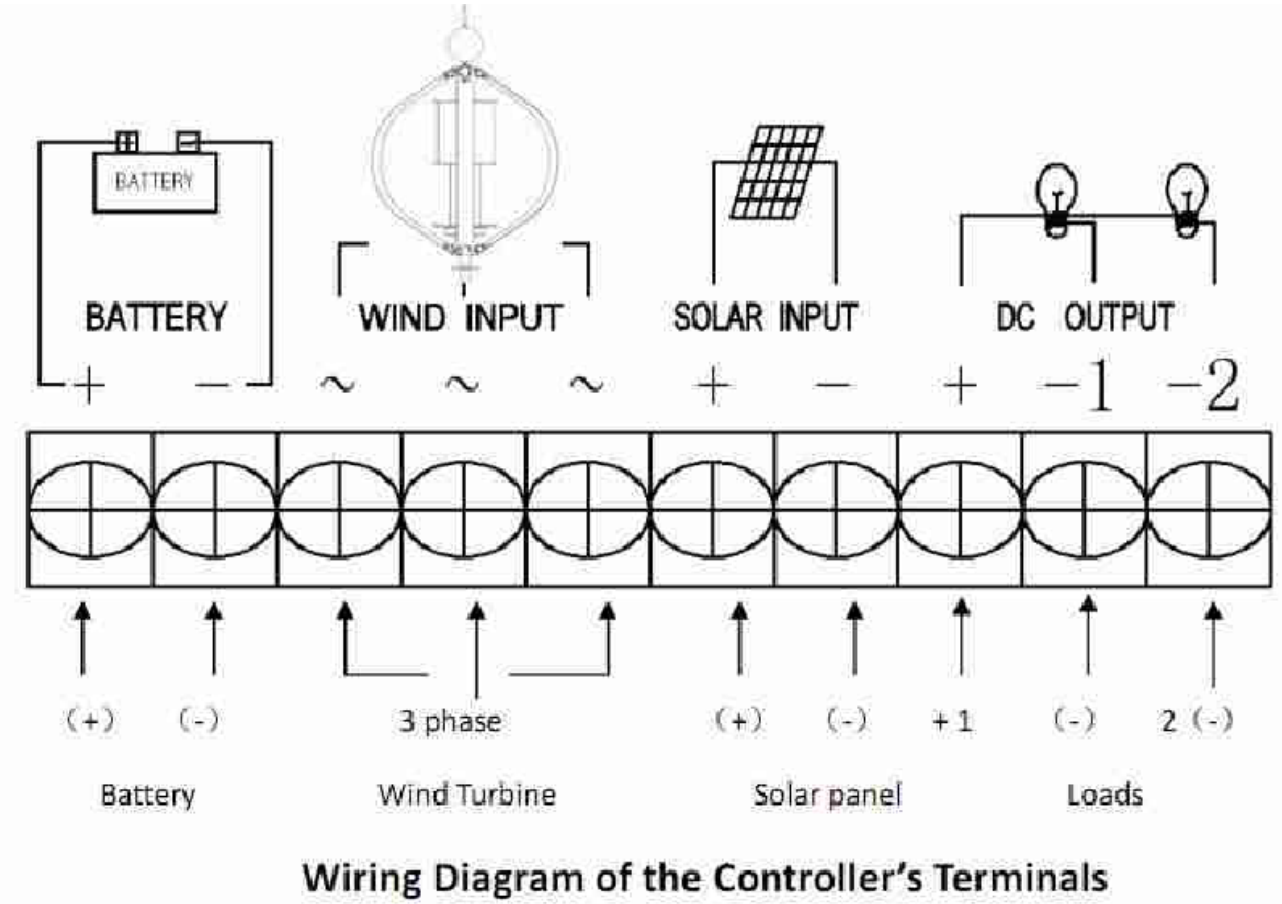


Figure 5-2 Wiring Diagram of Controller's Terminals



NOTE

Please refer to the User Manual of Controller for MBWP-400W for further information Figure 5-2 Wiring Diagram For Wind Solar Hybrid Wiring Diagram

5.4 Grounding

In order to protect the MBWP-400W Wind Turbine System against damage by lightening, static or over voltage, properly grounding the MBWP-400W Wind Turbine System is very important. Grounding procedures must be followed along with any local electrical codes.

The design of the grounding system depends on the local conditions, like the site of installation, type of soil, or a grounding bus already existing. If you are in doubt, contact with your local electrician for more information.

WARNING

- *SEVERE TURBINE DAMAGE CAN RESULT FROM IMPROPER GROUNDING.*
- *FAILURE TO PROPERLY GROUND WILL VOID THE WARRANTY.*

5.5 Fusing

To protect the battery against short circuit, fuse must be installed in the positive line between the Controller and Battery. The recommended fuse type is 50amp DC Slow-Blow fuse for 12V system or appropriate automatic circuit breaker.

The fuse must be placed as close to the battery as possible, however, not in the same compartment. Unsealed lead-acid batteries have vent holes releasing hydrogen which

forms detonating gas with the ambient air. A spark when blowing the fuse (or releasing an automatic circuit breaker) can detonate the explosive mixture.

6. Warranty

The MANBLAN provides two year limited warranty (warranty period) for MBWP-400W VAMWT and covers defects in materials, workmanship and quality (defeats) in MBWP-400W. The warranty is valid from the date of invoice to the original user. The limited warranty is also transferable and applied to subsequent owners only within the Warranty Period.

MANBLAN will repair and replace the defective products for free under the following conditions:

- The user has notified MANBLAN of Defeat within the Warranty Period
- MANBLAN verifies the existence of the Defeat that is covered within the limited warranty by its inspection, troubleshooting and any possible mean to identify.
- Shipping cost from MANBLAN to user for replacement or repaired parts.

MANBLAN has the option to use new or reconditioned parts in performing repair or replacement. MANBLAN also reserves the right to use parts or improved design in the repair or replacement. If you purchase the product from our dealer in your area, contact the dealer for replacement or repair or you may contact us directly at the following numbers:

Telephone: +7 495 502-65-84

Email Address: MANBLAN@MANBLAN.ru

Please provide the proof of purchase (dated invoice) for defective products repair or replacement.

The limited warranty does not apply to any product or part thereof damaged by following conditions:

- Any alternation to the product either internally or externally, or disassembly of the product.
- Not been used in accordance with User' Manual supplied with the product.
- Installed and Used in an unsuitable environment
- Operation or installation contrary to instructions pertaining to the product.
- Damaged during shipping, mishandled, neglected, improperly installed.
- Repair or service provided by an unauthorized repair facility
- Lightening strike without proper grounding

MANBLAN MAKE NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABLILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN MANUAL OR OTHER DOCUMENTATION PROVIDED BY IT INCONNECTION WITH THE PRODUCT.

ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION.

THE USE OF ANY SUCH INFORMATION WILL BE WNTIRELY AT THE USER'S RISK.

WARNING

Please note, the MANBLAN MBWP-400W VAMWT is not intended for use as the power source of life support system or other medical equipment or devices and MANBLAN makes no representation or warranty in connection with any use of the product for such purposes.